Improved Bio-sand Filter Ideas

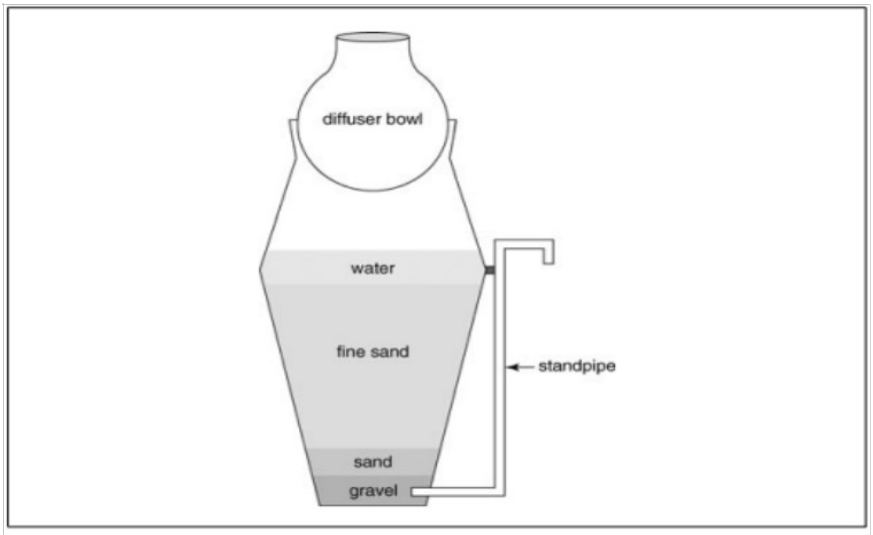
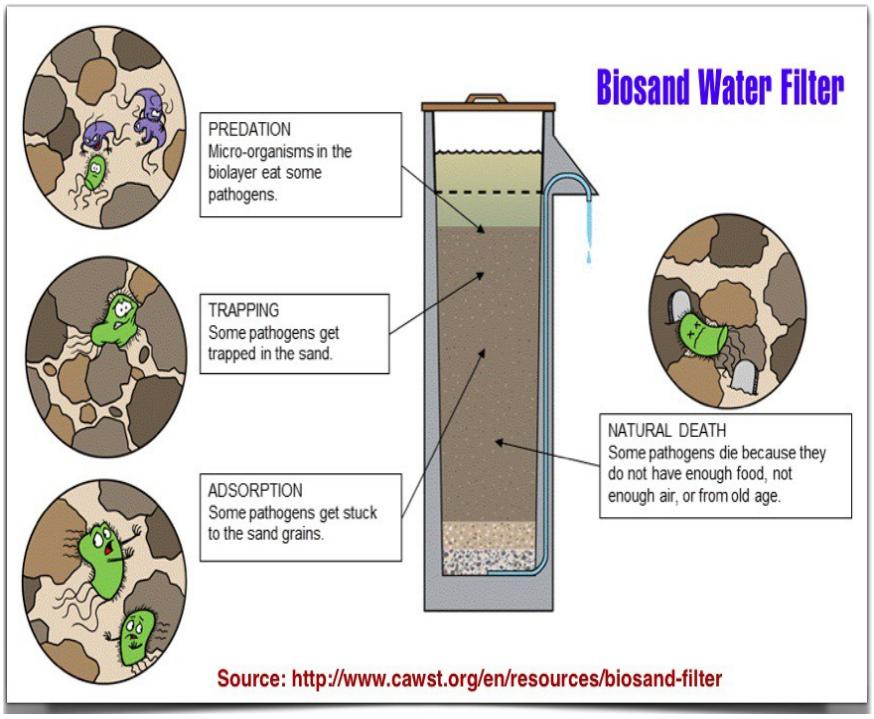


Figure 1G.1.2 Illustration featuring an indigenous biofilter constructed of clay jars.

Bio-sand filters can be a product of opportunity for a community or individual member. With proper knowledge of essential components one is able to construct their own filter out of an oil drum, plastic bucket, and/ or a clay pot, each ranging in effectiveness of course. Options will vary depending on the foreign/domestic organizations available as a resource, materials available, and the knowledge of the individual and/ or those surrounding

Design Parameters:

1. Bio-sand filters can be built wherever there is a good source of sand and gravel and where proper media preparation is undertaken.
2. The most widely used version of bio-sand filters are filled with › 16 to 20 in. (40 to 50 cm) of fine sand. This is the absolute minimum fine sand requirement to ensure the best quality of water possible.
3. A layer of static standing water (the supernatant) is automatically maintained by placing the outlet pipe 2 in. (5 cm) above the level of the top sand layer.
4. Allow 14 to 21 days for the biological zone to mature.
5. Water must be allowed to flow freely from the filter—never plug or put a hose or tap on the outlet spout



Predation:

- Must have adequate volume of bio-layer (Wider is better). Sits within the first few inches of the filter and will not penetrate too far down. Thus a wider top allows for larger surface area of bio-layer, rendering it more effective.

Trapping:

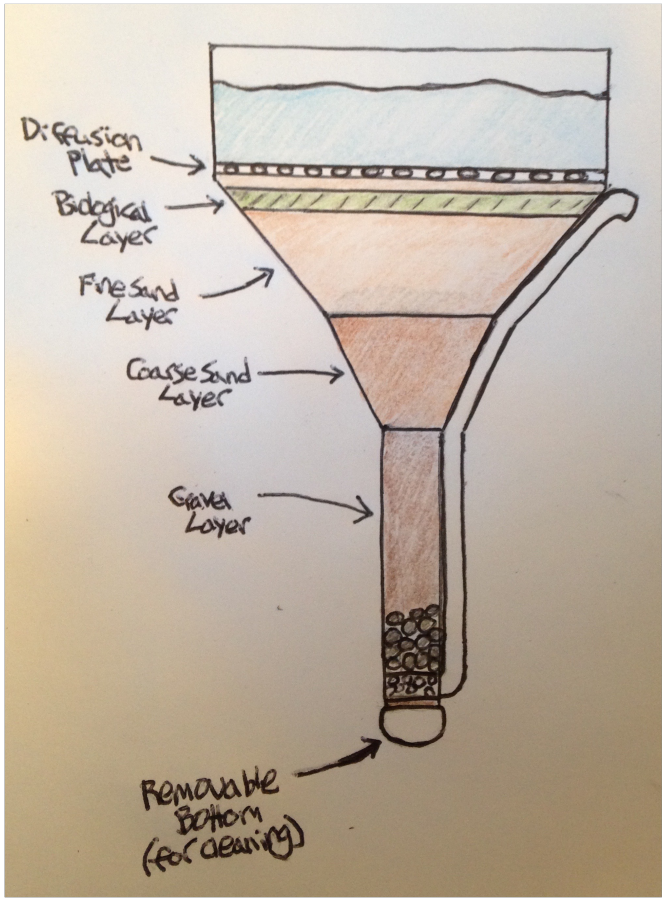
- Adequate volume of sand will be an issue here as packing in the lower level of the fine sand layer will have a major role in this mode of filtration.

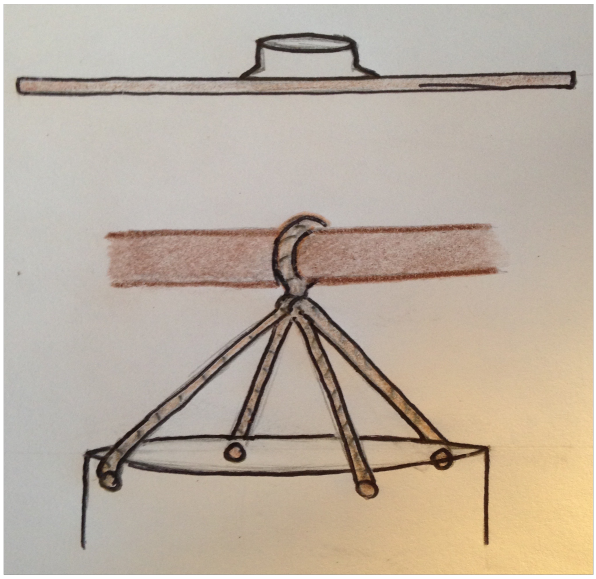
Adsorption:

- Silica (SiO_2 = quartz) is the main adsorptive material in sands. If water is made to flow through such a pile of sand, ions and toxins in the water may be adsorbed by the surfaces of the grains of sand, further removing pathogens.

Natural Death:

- The filter must be large enough and give the un-sanitized water enough contact time in order for each reaction to take place. If bacteria circumvent the above three mechanisms, a filter that allows for adequate contact time will lead to the cells death.





This design has been theorized as an imported devise (as the company's we would be working with utilize imported materials), assembled onsite, using domestic materials to complete.

Pro's:

- Wider top = better flow and greater surface area for increased bio-layer contact
- Height of tap maintains moisture within filter to stabilize bio-layer
- Tapered design decreases volume of gravel and coarse sand = lighter filter
- PVC (or any alternative to concrete) construction = lighter filter
- Funnel-like structure will allow for adequate pressure buildup to expel purified water at a decent rate while purifying takes place largely in the upper 1/3rd.

Con's:

- Many more parts and components are needed.
- Different houses will call for different mounts and/or may be insufficient support
- Costs may increase
- More parts to go wrong
- Cleaning may be an issue

Sources:
http://onlinelibrary.wiley.com/store/10.1002/9780471729259/asset/homepages/mc01g01.pdf;jsessionid=7D1A60EB111082FE6088E23A29943526.f01t04?v=1&s=09e2da7651c825682ccc10f56c626f432419252d